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The Effectiveness of Training Parents in Problem-Solving Techniques in  
Intervention with Language-Impaired Children

A Senior's Honor Project  
Submitted to the Faculty  
of  
The University of Tennessee, Knoxville

by  
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### **Abstract**

Speech-language pathologists (SLP) widely discuss involving parents in intervention with language-impaired (LI) children. The literature indicates that parents must feel competent in order to effectively carry out intervention (Coufal, 1993; Crais, 1993; Gutkin, 1993) and that use of a problem-solving process may enhance parental confidence (Crais, 1993; Coufal, 1993). In this study, an experimental group of six mothers with typically-developing children under the age of five will receive training in the Future Problem-Solving Method (Torrance, Bruch, & Torrance, 1974). A control group of six similar mothers will receive no training. Both groups will view video recordings of interactions between parents and their LI children and will brainstorm ways to alter the interactions in order to assist the LI children in developing language. Overall, the ratings of the experimental group will probably exceed those of the controls as evaluated by SLPs. Being involved in decision-making through the use of a problem-solving method could increase parental involvement in intervention with LI children.

## **The Effectiveness of Training Parents in Problem-Solving Techniques in Intervention with Language-Impaired Children**

As language-impaired children spend the majority of their time with their parents instead of with helping professionals, the involvement of parents in all aspects of language intervention is a topic of much interest in speech-language pathology. The literature indicates that parents can provide valuable insight into their children for the purpose of assessment (Crais, 1993; Gulker, 1992; Leonard, 1992). Also according to the literature, parents can help facilitate generalization from the therapeutic setting to the child's everyday environment (Gutkin, 1993). In addition, parents can take advantage of "teachable moments" that may occur throughout the day, utilizing these instances to help their children develop language (Gulker, 1992; Leonard, 1992).

Cheseldine and McConkey (1979) have demonstrated that "by altering parental language strategies in an appropriate manner, it is possible to produce a corresponding improvement in the child's language" (p. 618). Seitz and Hoekenga (1974) have also shown that changes in interactions between parents and their language-delayed children can move the child "to being an active participant in the communication process" (p. 30). Therefore, it seems that parents are capable of playing a very important role in language intervention with their children.

Although the literature shows that parents can be trained to effectively intervene with their language-impaired children, research indicates that training alone is not sufficient to ensure that parents will regularly carry out appropriate intervention techniques. In fact, after the completion of parental training, the majority of parents studied have not continued to intervene with their

children on a regular basis (for review see Fey, 1986, pp. 310-313). These parents were obviously concerned about their children's language impairments and desired to help their children develop language or they would not have undergone training in intervention techniques.

Why then did these parents not continue intervention with their children? Gutkin states (as cited in Gutkin 1993), "Failure to follow through faithfully with treatment plans could result from any of a multitude of causes, including. . . a lack of sufficient knowledge, skills, or self-confidence" (p. 84). Crais (1993) notes that, "In professional-family relationships, professionals are often seen as the 'experts' or 'help givers' whereas families are viewed as 'help receivers'" (p. 31). Because of this, "families may be less likely to take a directive or collegial role" (p. 31). As Gutkin and Crais indicate, families may not continue with intervention because they feel they are inadequate to effect any real change with their children.

In order for parents to feel adequate to help their children, it seems necessary that parents have an equal role with helping professionals. Crais (1993) argues that families and professionals should work together, i.e. collaborate, in assessment and later intervention rather than simply allowing the professionals to direct everything that happens. As Crais states, "If professionals are collaborators, then part of their role is to facilitate as much choice making by families as possible" (p. 32). Coufal (1993) also argues that parents and professionals should work together in collaborative consultation:

Because the social environment of a child has great influence upon behavior, there is reliance upon persons from within that environment to act as effective agents of change. The mediation that occurs between consultant and consultee not only effects change between and within those communication partners, but transmits

information necessary for the consultee to act as a change agent for the target child.

(p. 4).

She maintains that this necessary process of mediation and collaboration is a problem-solving process in which both partners, the parent and speech-language pathologist, share responsibilities (Coufal, 1993, p. 2).

Coufal (1993) continues to outline a problem-solving process that may be utilized by professionals as they seek to involve parents in intervention, stating that the "steps for problem solving most generally agreed upon include general orientation, problem definition and formulation, generation of alternatives, decision making, and verification" (p. 9). Coufal's process agrees very closely with the problem-solving process of Osborn (1963) and Parnes (1967). The basic principles of the process were developed by Osborn, while Parnes developed a training method for the process and taught it in a creative thinking course at the University of Buffalo (Parnes & Meadows, 1959, p. 171). Parnes obtained a grant from the Creative Education Foundation to examine the effectiveness of the process (Otto, 1977, p. 224). Parnes and Meadows (1959) conducted a study with 34 subjects matched on the basis of grade point average, age, and sex, 17 of whom had participated in Parnes's course and 17 who had received no problem-solving training, to determine if instruction in problem-solving aided individuals in generating "a greater number of good quality ideas" (p. 171). They found that "brainstorming instruction is an effective method for increasing the production of good ideas" and "that it is even more effective if preceded by extensive training in its use" (p. 176). Parnes and Meadows (1960) also conducted a study "to evaluate the persistence of the effects produced by the Creative Problem-solving course," employing an experimental group who had taken the course 4 years to 8 months earlier and two control groups who had never taken the course (p. 357). They found that

“increased productivity in creative thinking produced by the Creative Problem-solving course persist[ed] for a period of eight months or more after the completion of the course” (p. 361).

The Osborn-Parnes problem-solving process was developed into a program for use with gifted children by E. Paul Torrance. In 1972, Torrance summarized the results of 142 studies designed to test approaches to teaching children to think creatively. He concluded that “those [experiments] having the highest percentages of success in teaching children to think creatively are those that emphasize the Osborn-Parnes training program” (p. 132). According to Torrance, et al. (1974), “the methodology of creative problem-solving as formulated by Osborn (1963) and Parnes (1967) is . . . flexible and can be applied to almost any problem or subject matter. It is teachable at almost any age from kindergarten through graduate and professional school” (p. 119). Using the methods of Parnes and Osborn as a basis, Torrance et al. (1974) defined the phases of creative problem-solving as follows (p. 120):

1. Identifying problems and challenges.
2. Recognizing and stating the important problem.
3. Producing alternative solutions.
4. Evaluating alternative solutions.
5. Planning to put ideas into use.

Torrance et al. (1974) also described how to teach the method to students, involve students in competition, score student packets, set up state-wide programs, etc. Today more than 200,000 students in the United States and foreign countries are involved in the Future Problem-Solving Program (1994, Future Problem-Solving Program). According to Reschke’s (1991) case study, Torrance’s process enables students to organize their present knowledge and critically examine a chosen topic (pp. 30-31). The problem-solving skills of participating students have been found to



be superior to other gifted students when working with the same futuristic problem (Tallent-Runnels, 1993). Many of the students who have participated in the Future Problem-Solving Program have gone on to apply the process to everyday situations such as decision-making in their careers (Flack, 1991; Hibel, 1991).

The Future Problem-Solving Process has been simplified for use with all children by Bohnenberger and Terry (1994). This program, Action Based Learning in Education (ABLE) is currently being piloted in the school systems of Anderson County, Tennessee, and Elbert County, Georgia. The handouts used in ABLE outline the steps of the process very simply, adapting the process so that it can be easily used by almost anyone.

Parents and professionals could apply this problem-solving process to gain insight into their patterns of interacting with their children. Specifically, the use of this process may enable parents to pinpoint ways in which their interactions with their children may be modified in order to enhance the language development of their children.

### **Purpose**

The purpose of this study is to determine whether the use of problem-solving techniques can aid mothers of typically-developing children in identifying areas where modifications can be made in interactions between a parent and a language-impaired child in order to benefit the language development of the child. If these mothers can use a problem-solving process to generate quality ideas regarding changes that could be made in the parent-child interactions, then it would suggest that parents of children who are language-impaired could also use the process to generate similar strategies in order to assist their children in developing language.



### Method

An experimental group and a control group of mothers with typically-developing children will be formed. The experimental group will receive training in the problem-solving method (Torrance et al., 1974), while the control group will not receive training. Both groups will then view two videos of parent-child interactions between a parent and a language-impaired child and formulate ideas concerning ways to intervene in the parent-child interaction.

Subject Identification. Subjects will be solicited from cooperating Mother's Day Out programs at local churches. The directors of the programs will post fliers describing the study. The fliers will state that the purpose of this project is to examine factors related to early language acquisition. The researcher will meet with interested mothers for a brief pre-experimental interview. During this meeting, the mother will be administered a questionnaire (see Appendix A) in order to determine whether she and her family meet the criteria for selection. Each qualifying mother will be told that her participation will only require the knowledge that she has gained by being a mother of a young child or children.

Subjects. Twelve mothers ranging in age from 21 to 35 years will participate as subjects. Each subject will have one to three children, with at least one child being under the age of five. All children will have a history of normal language development as determined by parental report (see Appendix A). None of the mothers or their spouses will have careers that involve direct contact with children (child-care provider, elementary school teacher, pediatric nurse, etc.) and none will have professional experience in the field of speech-language pathology. These restrictions are made because such experience would likely aid mothers in identifying normal communication behaviors of children, problems in parent-child interactions, and language intervention techniques. The mothers will never have participated in the Future Problem-Solving

Program. All mothers and their families will be Caucasian and middle-class. Both parents will have obtained at least a high school degree.

The twelve mothers will be assigned to two groups, six mothers to an experimental group and six mothers to a control group. Within both the experimental and the control group, three mothers will have a female child under the age of five and three mothers will have a male child under the age of five. The mothers will be naive in regard to the status of their group assignment.

### Procedure

Stimuli. Two experimental video recordings will each feature an interaction between a mother and a language-impaired child. In one of the videotaped interactions, the language-impaired child will be female, and in the other the language-impaired child will be male. Both language-impaired children will range from three to five years in age. Both mothers and their children featured in the videotapes will be Caucasian and middle-class.

In the videos, the mother and child will play together or otherwise interact in a very natural way. These interactions will not be contrived or carried out specifically for the purposes of this study. Rather, these videotaped interactions will be obtained from those previously recorded at the University of Tennessee-Knoxville Hearing and Speech Center and Pediatric Language Clinic. From viewing the interactions, the subjects should judge that the children are not using language in an age-appropriate manner, but that the children are developmentally normal in every other way. The interactions between the mothers and their language-impaired children will be different from interactions between parents and typically-developing children. For example, the mothers will ask frequent yes/no questions, direct their child's play activities, speak at a rapid rate, etc. Each video will be approximately 10-15 minutes long. All subjects in both groups will receive the handouts providing directions for brainstorming. The handouts will also

provide space on which the subjects may write their ideas about how the parent-child interactions might be altered.

Experimental Sessions. Both groups will participate in two experimental sessions that will each be approximately one and a half hours in length. For both groups, the first session will be an instructional one. The experimental group will receive training in the problem-solving method (see Appendix B), but the control group will not receive training in this method. Instead, the control group will attend a session discussing ways to enhance early reading skills (see Appendix C). None of the discussion at either training session will deal with language impairment in any way. As the purpose of the study is to determine whether the problem-solving process itself aids in parental identification, discussion of language impairment at the instructional session may provide parents with an advantage unrelated to the problem-solving process. One week after the training session, both the experimental and control groups will meet, although they will meet separately. The groups will be assisted by a proctor who will provide directions but who will not assist the individuals in the groups in their formulation of ideas (see Appendix D). Both groups will view a video, and then each individual will be presented with a simple directive specifically related to the video. Both groups will be told and also given a handout which will say, "The speech-language pathologist who works with the child in the interaction you have just seen is interested in involving the child's mother in helping the child develop language. Based upon the video, what are some areas where this child's mother might be able to assist this child in developing language? How might this mother modify her ways of interacting with this child in order to intervene in the child's language development?" Members of both groups will be directed to brainstorm individually about the problem areas within the interaction and possible modifications the parent may make. The subjects in both groups will be informed that they have

30 minutes in which to write down their ideas. Both groups will be given the same handouts that were used in the problem-solving instructional session. At the end of 30 minutes, the subjects in both groups will be asked to present the handouts on which they have written their ideas to the proctor.

The groups will then view another video of an interaction between a mother and her language-impaired child and complete the same procedure as above. After they present their handouts to the proctor, the groups will be dismissed.

Upon completion of the project, the researcher will mail a thorough explanation of the purpose of the study and a summary of the general findings to the subjects in both groups. The researcher will also inform subjects of which group they were a member, and will thank them for their participation.

### **Results**

To determine whether training in problem-solving techniques aided mothers in assessing the video recordings of parent-child interactions, the ideas generated by the experimental group and the control group must be compared. The responses of the subjects in each group will be typed and will be as visually similar as possible. The responses of each subject will randomly be assigned a letter A-J by the researcher in order for the researcher to know which subjects were in the experimental and control groups.

The typed responses will be given to two speech-language pathologists (SLP) who are familiar with the parents and children who appeared on the two videos. Each SLP will have previously viewed the videos and formulated possible language facilitation goals for the mothers to focus on during parent-child interactions. Both SLPs will agree on the basic goals for each mother-child dyad. After receiving the responses from the groups, the SLPs will rate each

subject's assessment of the interaction (see Appendix E for rating scale) based upon their individual determinations of goals and their perceptions of the needs of the parents and children.

The researcher will then compare ratings of both SLPs, determining if ratings were comparable between SLPs and if ratings were comparable among groups for both video recordings. In order to increase interobserver reliability, both SLP judges will be trained in the problem-solving method just as the experimental group is trained. Receiving this training should help the judges better understand the rating scale and should increase the probability that the judges will score responses in the same manner. In order to increase intraobserver reliability, judges will be trained to score only what the subjects have actually written on the response sheets rather than what they infer the subjects to mean. Typing responses should also help increase intraobserver reliability by eliminating possible bias due to legibility of handwriting or neatness of presentation (Owens, 1991, pp. 26-39). Finally, the two video recordings should provide different but similar samples for brainstorming. Because of this, the overall scores of the experimental group and the control group should be consistent for both video recordings.

Using the numerical scores given by the SLP judges, the researcher must determine which group most successfully developed ideas that could impact the parent-child interactions in order to assist the children in developing language. Without data, the researcher cannot mathematically or empirically determine a significant difference between the groups. However, in order to determine a significant difference between the groups, the researcher must first find the presence of departure from the standard. In this study, the researcher must find areas (i.e., Underlying Problem, Final Solution) where the responses of the experimental group differed or departed from the responses of the control group, the standard. The researcher must then find the concentration of the departure, determining in what areas of the process the experimental group received higher



ratings than did the control group. Finally, the researcher must locate the causes for the departure, which should be the training in problem-solving techniques received by the experimental group (Juran, 1995, pp. 334-336). Although the performance of the groups cannot be empirically or mathematically assessed without data, the researcher intuitively believes that the experimental group will most successfully generate ideas for language-enhancing intervention within the parent-child interactions.

### **Discussion**

It is expected that the experimental group will generate a larger number of problems and solutions for both videotaped interactions than will the control group. The SLP evaluators will rate the experimental group as developing more valid ideas concerning areas in which improvements can be made within the parent-child interactions. The SLP evaluators will also rate the experimental group as developing more effective solutions for the problems which they have proposed. Finally, the SLP evaluators will rate the quality of the experimental group's Underlying Problems and Final Solutions more highly than the control group's for both interactions. Some mothers will likely have greater natural problem-solving abilities than will others. Some mothers will also be more perceptive and more adept at observing different behaviors in the parent-child interactions. Thus, there will probably be random variability among the mothers in each group. Nevertheless, the mothers in the experimental group will no doubt receive higher scores based upon the ratings given by the SLP evaluators.

As previously discussed, it is important for parents to be involved in decision-making in order for them to feel adequate to intervene with their children (Crais, 1993; Gutkin, 1993). Parents could be briefly trained in this problem-solving method, and they could use it, while working with the speech-language pathologist, to brainstorm possible ways to intervene with their

children. Being involved in decision-making through the use of this process could increase the parent's involvement beginning with assessment through intervention and maintenance.

Increased parental involvement could increase the efficacy of treatment. If parents are capable of carrying out much of the therapy by themselves, then a child would participate in fewer sessions with the speech-language pathologist. If parents are capable of intervening with their children, then remediation may take place in a much shorter time period due to the fact that parents can spend much more time with the child than can a speech-language pathologist. Increased efficacy in treatment would benefit the speech-language pathologist, the parents, and the child.

If the results of the proposed study indicate that the mothers of typically-developing children can use this problem-solving method effectively, then a logical subsequent study would be to examine the effectiveness of this problem-solving method with parents of language-impaired children. This could be accomplished by replicating this project using mothers who have language-impaired children. If mothers of language-impaired children who receive problem-solving training also generate more ideas which have a potential positive impact upon the parent-child dyad than similar mothers who lack training, then an intervention study could be conducted in which mothers actually use the problem-solving method with their own language-impaired children. The study could use a multiple-baseline design across subjects, employing three mothers and their language-impaired children under the age of five as subjects. Baseline data would be collected on all mother-child dyads. Intervention using the problem-solving method would be first implemented with dyad A. Intervention with dyads B and C would be "time lagged" to ensure experimental control. During each session, the mother's production of behaviors that inhibit their child's acquisition of language would be documented. It is expected that baseline data would



remain stable, but that constraining language behaviors would decrease during the intervention phases of the study.

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## Appendix A

### Parent Questionnaire

Mother's Name:

Father's Name:

Address:

Telephone Number:

Mother's Age:

Father's Age:

Mother's Highest Level  
of Education:

Father's Highest Level  
of Education:

Mother's Occupation:

Father's Occupation:

How many children do you have?

What are the ages of your children?

Have any of your children ever received speech or language therapy from a speech-language pathologist?

If so, for what reason?

Have any of your children ever been diagnosed with any type of developmental disorder or other similar condition which might effect the rate at which they acquire language?

Do any of your children have a hearing loss?

Have you ever had any reason to suspect that any of your children's speech and/or language was not developing normally?

Have you ever received training in creativity and brainstorming? If so, what type of training?

## **Appendix B**

### **Training Session for Experimental Group**

The experimental group will receive approximately one and a half hours of training in Torrance et al.'s (1974) problem-solving process. The group will be provided with an overview of the process, with emphasis upon the steps involved in the process. This explanation will be supplemented by the use of overheads, handouts, and videos.

The researcher will briefly introduce the topic to the group, telling the group that they will be receiving training in a problem-solving method. As background information, the researcher will explain that the particular method that will be discussed was originated by Sidney Parnes and Alex Osborn in the earlier part of this century for use in business applications. Their basic model was adapted for academic use in 1974 by E. Paul Torrance. Torrance developed a five-step method that students in grades 4-12 could use for competitive problem-solving, and he called this the Future Problem-Solving Program. Torrance's model has since been adapted for use in the classroom and is used in a program known as ABLE which is currently being piloted in two school systems. This method can be applied to many different circumstances, and students have applied it to diverse situations ranging from raising money to restore the Battleship Texas to designing a waste water plant building in Massachusetts. The researcher will inform the subjects that they will be applying this method to some situations in the next session.

The researcher will explain that the rationale for developing this model is that when faced with a problem, most individuals are reactive rather than proactive. That is, instead of determining the best solution to the problem through reasoning, they make a hasty, emotional decision based upon what seems to be the easiest, least painful solution (Bohnenberger & Terry,

1994). This method trains individuals to instead take an active role in solving problems. This method also encourages individuals to look at problems from many different perspectives rather than simply from the most familiar angle.

The researcher will then say, "Let's begin with brainstorming." The researcher will display "Things Which Run" overhead and encourage subjects to write down everything they can think of that runs in thirty seconds. At the end of thirty seconds, subjects will be asked to share responses. The responses of some subjects will be likely restricted to cats, dogs, etc. Possible options such as motor, air conditioners, refrigerators, noses, etc. should be pointed out to subjects to illustrate the point of looking at situations from more than one angle. The researcher will next display the abstract shape overhead. Different subjects should be asked what they see, and answers will vary. The researcher will then turn the shape around again and ask different subjects what they see. This again illustrates the point of looking at a situation from different perspectives. To further aid subjects in thinking about problem-solving, the researcher will distribute the handout "Effective Problem Solving Relies On" shown in Figure 1 as well as displaying the overhead. The researcher will briefly discuss the information provided on the handout.

The researcher will next present the steps of the model, again providing an overhead display as well as a handout for the subjects. The researcher will explain each step thoroughly, demonstrating each step while brainstorming about the problems in the room in which each session is being held (e.g., not enough windows, uncomfortable chairs, inadequate lighting, etc.).

After an explanation of the steps, the subjects will work through the steps on a sample problem themselves. The researcher will say: "Now you will have a turn to work through these steps yourselves. To illustrate how simple the process is and how applicable it is to any situation, we will utilize a scenario with which you are all familiar: a fairy tale." The researcher will present

a video of either "The Three Bears" or "Jack and the Beanstalk," stopping the video about halfway through and asking subjects to write down the problems already presented. Since subjects will be familiar with the story, it should be relatively easy for them to proceed with the remaining steps in the process after they have brainstormed possible problems. Subjects will be given handouts on which they may brainstorm individually.

After the subjects successfully complete the process using the fairytale, they will view a video of an interaction between a parent and a normally-developing child. In the video, the parent will be attempting to use age-inappropriate toys in playing with the child. The subjects will be encouraged to apply the problem-solving method to this situation as well. While the subjects work individually, the researcher will be available for questioning. The researcher will also check on the individual work of every subject to ensure that the subjects understand the method.

Before subjects leave, the researcher will remind subjects of the next session, repeating that they will be utilizing the problem-solving method then. Subjects will not be asked to practice the process before their next session.



## **Appendix C**

### **Training Session for Control Group**

The control group will participate in a session in which they are given instructions in ways to enhance early reading skills. However, the discussion in the session will not focus on methods of language stimulation using books. The group will meet for approximately one and a half hours, and will be provided with an overview of factors influencing reading success. This explanation will be supplemented by handouts and overheads.

The instructor will briefly introduce the topic to the group, explaining that parents are the child's first teachers. Before children ever get to school, parents play a large role in setting the stage for the child's school performance. To help parents begin thinking about their children's abilities, checklists detailing skills that children should possess before beginning school will be passed out to the parents. The checklist will include such items as scanning a page from left to right, understanding purpose of books, being able to tell simple stories, etc. The purpose of the checklist is not to alarm parents about the abilities of their children, particularly since many of their children may still be very young. Rather, the checklist is simply a tool to stimulate thought and will be presented as such by the instructor.

After the parents have had time to briefly look over the checklists, the instructor will give the parents handouts detailing ways to enhance reading readiness. The instructor will talk about methods, emphasizing that it is not necessary for parents to use worksheets or special pre-reading programs with their children. Instead, reading readiness can be easily achieved through simple daily activities and routines. Parents should understand that most parents already do the things that help their children prepare to read, but more knowledge of those things may enable parents to

better prepare their children. The instructor should provide simple examples for parents and provide opportunity for discussion.

## **Appendix D**

### **Session for Both Experimental and Control Groups**

Both groups will view a video of an interaction between a mother and her language-impaired child, and then each individual will be presented with a simple directive specifically related to the video. For example, both groups will be told and also given a handout which will say, "The speech-language pathologist who works with the child in the interaction you have just seen is interested in involving the child's parents in helping the child develop language. Based upon the video, what are some areas where this child's parent might be able to assist this child in developing language? How might this parent modify her ways of interacting with the child in order to intervene in the child's language development?" Members of both groups will be directed to brainstorm individually about problem areas within the interaction and possible modifications that the parent may make. The subjects in both groups will be informed that they have thirty minutes in which to write down their ideas. The experimental group will be given the same handouts that were used in the training session, as will the control group. At the end of thirty minutes, the subjects in both groups will be asked to present the handouts on which they have written their ideas to the proctor.

The groups will then view another video of an interaction between a mother and her language-impaired child and complete the same procedure as above. After they present their handouts to the proctor, the groups will be dismissed.

## Appendix E

### Rating Scale for Evaluation of Subject Responses

- Assign **1 point** for each problem. **Add** an additional point if you think the problem as stated is a valid area in which improvements can be made based upon your knowledge of the parent and child and your observation of the videotape.
- Comparing across packets, judge the Underlying Problem(s) on a scale of **1-10** with 10 being the **highest** score. Judge the Underlying Problem(s) based upon your observation of the videotaped interaction.
- Assign **1 point** for each solution. **Add** an additional point if you think the solution is a viable way to solve the Underlying Problem(s) as they are stated.
- Comparing across packets, judge the Final Solution(s) on a scale of **1-10** with 10 being the **highest** score. Judge the Final Solution(s) based upon your experiences with the parent and child and based upon your observation of the videotaped interaction.
- Calculate the number of **total points** for each packet and arrange the packets in order from **first to last**.

**Figure Caption**

Figure 1. Effective problem solving relies on. (Reprinted with permission of Tennessee Future Problem-Solving Program.)

# EFFECTIVE PROBLEM SOLVING RELIES ON

## *Creative Thinking*

**Making and expressing meaningful new connections; it is a process in which we—**

- perceive gaps, paradoxes, challenges, concerns, or opportunities;  
**and then—**
- think of *many* possibilities;
- think and experience in *varied* ways, with different viewpoints;
- think of *new and unusual* possibilities; and
- extend and *elaborate* alternatives.



## *Critical thinking*

**Analyzing and developing ideas; it is a process in which we—**

- screen, support, and select possibilities,  
**and move towards action by:**
- making inferences and deductions;
- comparing and contrasting ideas;
- categorizing and sequencing options;
- improving and refining promising alternatives;
- making effective judgments and decisions.